WEATHER, FORECASTS AND WARNINGS.

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NORTHERN HEMISPHERE PRESSURE DISTRIBUTION.

Over the United States and the Canadian Northwest, excluding Alaska, pressure was generally high during the first decade of the month. After that time there was a rapid alternation of moderate areas of high and low pressure, none of much consequence, except the final development of a severe storm off the coast of Nova Scotia on the morning of the 30th, when the barometer at Halifax, Nova Scotia, read 28.82 inches. Over Alaska, except on the 1st, pressure was also high during the first decade of the month, and generally low thereafter with only a moderate high area about the middle of the month.

Over the central and southern portions of the western Atlantic Ocean, pressure above the normal prevailed throughout the month and also over the corresponding latitudes to the eastward, except between the 7th and 10th.

Over Iceland low pressure during the first week of the month was followed by the opposite condition during the second week with the high pressure strongly marked on the 12th, 13th, and 14th. After the middle of the month moderately low pressure was the rule. Similar conditions prevailed in a general way over the northern portions of the British Isles, but over the southern portion low pressure prevailed until the 12th with marked minima on the 8th and 9th, and after the 12th moderately high pressure prevailed until the 29th.

Over western continental Europe pressure was low during the first decade of the month and again on the 17th and 18th. During the remainder of the month it was comparatively high. Over eastern Europe moderately high pressure predominated, except over southern Russia, where it was low during the first decade. The conditions over western Siberia were in the main similar to those over eastern Europe, except that over the former area low pressure was the rule during the last week of the month. Over central Siberia pressure above the normal was general and there were at least seven well-defined crests. Nearer the Pacific, in eastern Siberia, eastern China, Japan, and the Philippine Islands low pressure predominated after the first few days of the month, with the best defined types between the 10th and 15th, except over the Philippines, where they were about four days earlier.

Over the middle latitudes of the Pacific Ocean low pressure was the rule, while over the northern ocean it was generally high during the first half of the month and low the second half.

WEATHER IN THE UNITED STATES.

At the beginning of the month pressure was high over the eastern half of the country and low over the western half, except in North Dakota, Montana, and the North Pacific States. There had been showers in the Northwest followed by a decided fall in temperature to the freezing point or lower, while over the remainder of the country the weather had been clear and warm except in the Atlantic and Gulf States where temperatures were moderately low. The principal barometric depression was over the middle Plateau with a narrow trough of low pressure running northeastward to a secondary center over eastern Minnesota. Twenty-four hours later the main center was over northern New Mexico with the trough still trending northeastward, while the crest of the high pressure had settled down over the South Atlantic States. Good rains had fallen in Nebraska and light rains and snows in Wyoming and the Northwest, while over the remainder of the country clear weather continued to prevail. It was much warmer in the East and South, but quite cold in the West. There was very little movement on the part of the western low area, and on the morning of the 3d the narrow trough extended from the Texas Panhandle to eastern Minnesota, with a low at each end. In the meantime another low of marked proportions had moved eastward over the Canadian Northwest and was central over Manitoba. Pressure continued high in the Southeast and on the north Pacific coast, and thundershowers had occurred over the sections covered by the United States depression, but there were no others of consequence. Temperatures continued to rise in the East and were considerably above the seasonal average, while in the West they remained low with heavy to killing frosts in the Northwest, including Wyoming and western Nebraska. The western depression was much the same on the 4th, but the rain had extended into Texas, the upper Mississippi Valley, and the upper Lake region, and had fallen in greater quantity. At the same time the Manitoba low area had greatly subsided. Temperatures were now abnormally high over the East, and although still low were once more rising over the West except over the rain areas.

It should be noted at this time that a high area that on the morning of the 2d was over eastern Manitoba in moderate form had continued to move eastward, but without increase in intensity until the evening of the 3d, when it was over the lower St. Lawrence Valley. On the morning of the 4th strong high pressure prevailed over the Northeast and extended southwestward through the Atlantic and east Gulf States and the Ohio Valley. The same general conditions persisted until the morning of the 6th, when the disturbance was over Ontario and an area of high pressure of considerable magnitude had descended upon the western portion of the country, with a corresponding pressure decrease over the East and South and the western Atlantic Ocean. Pressure continued to fall over the extreme East, and by the morning of the 7th showers and thunderstorms had occurred over New England, the Middle Atlantic States, and the Ohio Valley. The high area was attended by low temperatures and frosts and on the 6th a special bulletin was issued announcing the termination within 36 hours of the warm wave then prevailing over the East. The high area moved eastward, and by the morning of the 8th had reached the upper St. Lawrence Valley attended by heavy frosts from that section westward, and comparatively low temperatures prevailed over the entire eastern half of the country.

In the meantime (the evening of the 6th) another extensive high area had appeared in the extreme Northwest, but irregular and disturbed conditions prevailed to the eastward and southward with unsettled and showery weather that continued until the night of the 9th, by which time the crest of the high area was over northwestern Minnesota and pressure was generally high over the interior except in the Plateau region. On the morning of the 10th heavy to killing frosts occurred

throughout the Lake region and temperatures much below the seasonal average prevailed over the eastern half of the country, except in the South. Frosts again occurred on the morning of the 11th over the Lake region and extended into the Ohio Valley and portions of the middle Atlantic States. On the following morning (12th) the crest of the high area was over Virginia with much diminished strength and frosts occurred in the upper Ohio Valley, the lower Lake region, and the Middle Atlantic States, including Virginia. In the Middle Atlantic States great damage was done to growing fruits and vegetables by the frost of the 12th, while those of the 10th caused considerable loss of fruit in the upper Lake region. It will be noticed that frosts were persistent over much of the northern portion of the country, especially over the North Pacific States and the extreme Northwest, and practically all, including, of course, those of the central and eastern portions of the country, were forecast at the proper time.

During the 9th a low appeared over British Columbia. It moved eastward attended by showers in its immediate vicinity and by the evening of the 12th it had reached Lake Superior, causing some moderately high winds for which storm warnings had previously been ordered. In the meantime another well-defined disturbance had developed over the middle Plateau. The northern disturbance continued eastward with decreasing intensity and passed beyond the Gulf of St. Lawrence during the 14th without other effect than local showers east of the upper Lakes. The middle Plateau disturbance, however, was of more pronounced type and with a high pressure area to the northward and westward caused general, although not heavy, rains from the Missouri Valley westward, beginning during the night of the 12th. By the 14th the storm center was over Kansas, and the rains had extended into the greater portion of the Lake region. The high area to the northward had increased materially in strength with its crest over Lake Superior. Pressure was also high over the Atlantic Ocean and a narrow area of moderate depression between the two highs had caused rains in the southern portion of the Middle Atlantic States. Rains had also continued in the West and Northwest and cold weather prevailed over the North and West, with freezing temperatures over the northern upper Lake region, the Northwest and the extreme West. Warnings of frost or freezing temperatures had previously been issued. On the morning of the 15th the center of disturbance was over southeastern Minnestota, with a narrow trough running southwestward into Texas. Rains continued in the central west and had extended lightly into the eastern lower Lake region and the Middle Atlantic States, while the high area had moved to the St. Lawrence Valley, where frosts occurred. After this time the low lost its definite formation and drifted eastward and southeastward with diminishing intensity, passing off the New Jersey coast during the night of the 16th and leaving a slight secondary depression over Virginia and western North Carolina that passed off the coast during the 18th. The rains reached the coast States during the night of the 15th, extending southward to the Gulf of Mexico, and did not cease until the North Carolina depression had disappeared.

While the last depression was disintegrating, another was moving in from the Canadian Northwest, and by the morning of the 16th it had reached the Northern Plains States with a moderate high area over the North Pacific States. Thus far only light and scattered showers had attended the depression, but by the morning of the 17th there was a well-defined disturbance over Lake Superior and a secondary one over Oklahoma. Rain was falling from the Missouri Valley northeastward, and the north Pacific high area had reached the Northwestern States accompanied by a decided fall in temperature, while another low had made its appearance over Nevada. The Lake Superior low drifted eastward attended by local showers, and its intensity diminished for a time, but there was a renewal after the St. Lawrence Valley was reached, and on the 19th it passed into the ocean as a pronounced disturbance. The high area following moved slowly eastward attended by lower temperatures, and by frosts from North Dakota eastward over the Lake region and the north Atlantic States, the frosts occurring over the latter section on the morning of the 20th. Warnings for these frosts were invariably issued on the day previous to their occurrence.

On the 17th pressure was generally low from Kansas and Oklahoma westward, with the principal center of depression over western Colorado and secondary ones over Oklahoma and southwestern Nevada. At this time the low last discussed was over Lake Superior, and pressure was high to the northwestward with rather low temperatures, but there had been no precipitation worthy of mention over the West, except in the lower Missouri Valley. By the morning of the 18th the Nevada low had moved a little to the eastward, while the others had disappeared. Rains, however, had fallen over the middle and northern districts from the Rocky Mountains westward, and there had also been local showers over Montana, South Dakota, and the Middle West generally, including the Great Central Valleys. The high area over the Northwest had increased in magnitude and was central over the Dakotas attended by low temperatures over the Northwest and some heavy frosts in North Dakota. On the morning of the 19th the western storm was central over southeastern Wyoming with increased energy, with the cold high area immediately to the northward, and substantial rains had fallen over the northern States from the Dakotas westward, with some snow over portions of North Dakota. There had also been rains in Utah and showers in the lower Missouri Valley.

The high and low areas continued eastward, maintaining their same relative positions, until by the morning of the 21st the low was central over eastern Iowa and the high area had reached New England. Rains had continued in the West and had extended into the South and East as far as the Atlantic States. A storm warning on the night of the 19th for Lakes Michigan and Superior failed of verification, although brisk winds occurred. Temperatures had risen in advance of the low area, and while remaining low in the Northwest had fallen decidedly in the central Plains States and the Missouri Valley. During the next two days the center of the low area moved to the lower St. Lawrence Valley with decreasing intensity, but in the meantime a low area that had appeared over New Mexico on the 20th had moved to extreme northwestern Florida, and on the morning of the 23d a narrow trough of low pressure joined the two depressions. A moderate high area followed, but it was not until the night of the 24th that the disturbance passed into the Atlantic Ocean.

While this disturbance was passing away, changes had been rapid in the interior. The high area of the 23d was over the Ohio Valley and the South on the morning of the 25th, while another of greater magnitude was over the upper Lakes. It had moved from the Canadian Northwest, accompanied by a marked fall in temperature, and on the morning of the 25th heavy and killing frosts

were reported over the Michigan Peninsula. The high areas continued eastward, attended by frosts over the northern districts from northern Michigan eastward into interior New York. In the rear of the last high area a low followed, which had appeared in the West during the 23d. Until it reached the Atlantic Coast its behavior was very similar to that of its immediate predecessor, but on the morning of the 28th the disturbance extended in trough shape from the Carolinas to New York with a center at each end, while a strong high area (30.40 inches) had developed over the north Atlantic Ocean. On the following morning there was but a single center off the New England coast but with lower barometer readings, and the weather had cleared in the Atlantic States, except in Maine. The high area to the northeastward had disappeared, and pressure was also generally low over the interior of the country. On the morning of the 30th the barometer at Halifax read 28.82 inches, a fall of nearly three-quarters of an inch in 24 hours, but no high winds of consequence were reported at coast stations in the United States. Along the Nova Scotia coast, however, the winds were reported to have caused considerable damage. By the close of the month the last traces of the storm had vanished. Pressure rose but little in the rear of this storm, but it was followed by a considerable fall in temperature over all districts east of the Mississippi River.

Pressure was low over the Canadian Northwest from the 24th to the 28th, inclusive, but without incident until the morning of the 27th, when the pressure fall also covered the northwestern portion of the United States and another low of fair proportions covered the Plateau and the Pacific States. Occasional thunderstorms resulted from the Rocky Mountains westward to the ocean, with low temperatures, while to the eastward as far as the Allegheny Mountains clear weather prevailed, and temperatures were abnormally high throughout the Plains States, the Great Central Valleys, and the South. The western low areas moved eastward during the 28th, but on the morning of the 29th and thereafter until the close of the month not much of them remained, except a few moderate depressions that at intervals caused local showers in the Central Valleys and the Middle and South Atlantic States, reaching the latter section during the 31st. At the end of the month barometric conditions were unsettled throughout the country but without much precipitation. Temperatures continued high over the interior States east of the Rocky Mountains and had risen to the westward, except in the middle Plateau.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since Jan. 1.	Average departures since Jan. 1.
New England	12	53.1	−1.5	+14.6	+2.9
Middle Atlantic	15	61.8	+0.3	+19.9	+4.0
South Atlantic	10	70.8	+1.0	+15.4	+3.1
Florida Peninsula [1]	8	75.0	−1.2	+11.2	+2.2
East Gulf	11	72.1	−0.1	+ 5.2	+1.0
West Gulf	11	72.3	−0.6	− 5.0	−1.0
Ohio Valley and Tennessee	14	65.1	0.0	+ 7.3	+1.5
Lower Lakes	11	56.2	−1.3	+ 9.1	+1.8
Upper Lakes	13	51.7	−1.1	− 0.6	−0.1
North Dakota [1]	9	51.1	−2.3	− 3.3	−0.7
Upper Mississippi Valley	14	61.4	−0.4	+ 2.2	+0.4
Missouri Valley	12	61.7	−0.2	+ 2.8	+0.6
Northern slope	9	52.7	−0.3	− 9.0	−1.8
Middle slope	6	65.0	+2.2	− 3.5	−0.7
Southern slope [1]	8	71.2	+1.7	− 6.4	−1.3
Southern Plateau [1]	8	66.4	−0.6	−14.5	−2.9
Middle Plateau [1]	10	56.8	+1.6	− 6.0	−1.2
Northern Plateau [1]	10	55.4	+0.6	−11.4	−2.3
North Pacific	7	53.1	0.0	− 5.2	−1.0
Middle Pacific	7	58.5	+0.9	− 3.1	−0.6
South Pacific	4	61.7	−0.1	+ 2.2	+0.4

[1] Regular Weather Bureau and selected cooperative stations.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
New England	11	2.76	82	−0.60	−0.30
Middle Atlantic	15	3.83	108	+0.30	−0.20
South Atlantic	11	2.29	60	−1.50	−0.70
Florida Peninsula [1]	9	3.26	80	−0.80	+1.30
East Gulf	11	3.38	97	−0.10	+1.70
West Gulf	10	2.93	71	−1.20	−1.00
Ohio Valley and Tennessee	14	3.15	80	−0.80	+4.30
Lower Lakes	10	3.60	112	+0.40	+5.20
Upper Lakes	14	3.07	88	−0.40	+0.30
North Dakota [1]	9	1.40	54	−1.20	−2.60
Upper Mississippi Valley	15	3.76	90	−0.40	+0.60
Missouri Valley	12	4.11	98	−0.10	+0.20
Northern slope	7	2.25	96	−0.10	−0.10
Middle slope	6	2.41	63	−1.40	−2.10
Southern slope [1]	8	2.69	71	−1.10	−2.20
Southern Plateau [1]	9	0.07	19	−0.30	−0.40
Middle Plateau [1]	11	0.62	51	−0.60	−2.10
Northern Plateau [1]	10	1.27	76	−0.40	−1.10
North Pacific	7	2.10	81	−0.50	−6.40
Middle Pacific	8	0.94	76	−0.30	−7.80
South Pacific	4	0.18	31	−0.40	−2.50

[1] Regular Weather Bureau and selected cooperative stations.

Average relative humidity and departure from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	70	−8	Missouri Valley	69	+4
Middle Atlantic	66	−6	Northern slope	65	+7
South Atlantic	69	−5	Middle slope	58	−3
Florida Peninsula	73	−3	Southern slope	52	−9
East Gulf	70	−1	Southern Plateau	32	0
West Gulf	72	−3	Middle Plateau	42	−4
Ohio Valley and Tennessee	64	−4	Northern Plateau	56	0
Lower Lakes	68	−3	North Pacific	77	0
Upper Lakes	71	−1	Middle Pacific	67	+1
North Dakota	66	+4	South Pacific	69	0
Upper Mississippi Valley	67	−1			

Average cloudiness and departure from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.8	+0.3	Missouri Valley	5.5	+0.4
Middle Atlantic	5.0	0.0	Northern slope	5.9	+0.4
South Atlantic	4.3	−0.2	Middle slope	4.4	−0.5
Florida Peninsula	4.4	0.0	Southern slope	3.2	−1.2
East Gulf	4.2	−0.5	Southern Plateau	2.2	−0.5
West Gulf	3.4	−1.4	Middle Plateau	4.2	+0.1
Ohio Valley and Tennessee	5.2	+0.2	Northern Plateau	6.1	+1.0
Lower Lakes	5.2	−0.2	North Pacific	6.2	−0.1
Upper Lakes	5.8	−0.3	Middle Pacific	3.5	−0.5
North Dakota	4.3	−1.2	South Pacific	3.8	+0.3
Upper Mississippi Valley	6.0	+0.7			

Maximum wind velocity.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Atlanta, Ga.	31	60	nw.	Point Reyes Light, Cal.	1	57	nw
Fort Smith, Ark.	14	50	sw.	Do.	12	66	nw.
Mount Tamalpais, Cal.	12	64	nw	Do.	13	60	nw.
Do.	13	60	nw.	Do.	23	54	nw.
Do.	14	53	nw.	Do.	24	53	nw.
Do.	15	60	nw.	Do.	27	58	nw.
Do.	16	60	nw.	Do.	28	72	nw
Do.	17	52	nw.	St. Paul, Minn.	1	52	sw.
Do.	27	54	nw.	Sioux City, Iowa.	13	52	e.
New York, N. Y.	10	54	nw.	Toledo, Ohio.	21	50	sw.
Norfolk, Va.	30	62	n.	Williston, N. Dak.	11	52	nw.
North Head, Wash.	9	56	se.				